

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A chirped pulse amplification system comprising, a low group delay ripple nonlinearly chirped fiber Bragg grating pulse stretcher system, said ~~fiber~~ ~~Bragg grating~~ pulse stretcher system producing stretched pulses longer than 300 ps; at least one fiber amplifier following said pulse stretcher system; and a pulse compressor for compressing said stretched pulses by more than a factor of 50, producing compressed pulses having a bandwidth greater than 1 nm.

2. (currently amended): A chirped pulse amplification system comprising, a low group delay ripple nonlinearly chirped fiber Bragg grating pulse stretcher system, said ~~fiber~~ ~~Bragg grating~~ pulse stretcher system producing stretched pulses longer than 1 ns; at least one fiber amplifier following said pulse stretcher system; and a pulse compressor for compressing said stretched pulses by more than a factor of 150, producing compressed pulses having a bandwidth greater than 1 nm.

3. (currently amended): A chirped pulse amplification system comprising, a low group delay ripple nonlinearly chirped fiber Bragg grating pulse stretcher system, said ~~fiber~~ ~~Bragg grating~~ pulse stretcher system producing stretched pulses longer than 100 ps; at least one fiber amplifier following said pulse stretcher system; and a pulse compressor for compressing said stretched pulses by more than a factor of 50, said compressed pulses having a bandwidth greater than 1 nm.

4. (currently amended): A chirped pulse amplification system comprising, a low group delay ripple nonlinearly chirped fiber Bragg grating pulse stretcher system, said pulse stretcher system producing stretched pulses longer than 100 ps; at least one according to claim 3, ~~wherein said amplifier comprises one of a bulk amplifier, a fiber amplifier, a diode laser amplifier, a parametric amplifier, a Raman amplifier or a combination thereof;~~ following said pulse stretcher system; and a pulse compressor for compressing said stretched pulses by more than a factor of 50, said compressed pulses having a bandwidth greater than 1 nm.

5. (currently amended): A chirped pulse amplification system as in claim 3, wherein said ~~fiber Bragg grating~~ pulse stretcher system includes plural concatenated fiber Bragg grating stretchers.

6. (original): A chirped pulse amplification system as in claim 3, wherein said pulse compressor comprises at least one fiber Bragg grating compressor and a bulk grating compressor.

7. (original): A chirped pulse amplification system as in claim 3, wherein optimally compressed pulses are obtained at a target downstream from said pulse compressor, where the optical beam-path between said pulse compressor and said target further contains additional optical elements other than air.

8. (original): A chirped pulse amplification system as in claim 7, wherein said additional optical elements comprise optical beam delivery fibers.

9. (currently amended): A chirped pulse amplification system as in claim 8, wherein said delivery fibers comprises one of a -single-mode fiber, a multi-mode fiber operated with a

single-mode output, a holey fiber, a photonic crystal fiber, ~~and or~~ a fiber with a guiding air-hole core.

10. (currently amended): A chirped pulse amplification system, comprising; a seed pulse source producing -short optical pulses with a ~~certain~~-spectral bandwidth greater than 1 nm; a nonlinearly chirped fiber Bragg grating pulse stretcher, said ~~fiber Bragg grating pulse~~ stretcher exhibiting a group delay ripple of less than 10 ps within the spectral bandwidth of said seed pulse source; an amplifier following said pulse stretcher; and a compressor for recompressing ~~said~~ stretched pulses.

11. (currently amended): An optical combination, comprising; a seed pulse source producing optical pulses with a ~~certain~~-spectral bandwidth greater than 1 nm; a nonlinearly chirped fiber Bragg grating pulse stretcher system, said ~~fiber Bragg grating pulse~~ stretcher system exhibiting a group delay ripple of less than 10 ps within the spectral bandwidth of said seed pulse source; and an amplifier following said pulse stretcher system.

12. (canceled).

13. (canceled).

14. (canceled).

15. (currently amended): A chirped pulse amplification system, comprising; a seed pulse source producing short optical pulses; a stretcher for stretching said pulses; ~~and~~ a plurality of concatenated sections of predominantly polarization maintaining fiber, at least one of which is also an amplifier; and at least one polarizer inserted between any two sections of said predominantly polarization maintaining fiber.

16. (cancelled).

17. (cancelled).

18. (currently amended): ~~A system as claimed in claim 17,~~ A polarization maintaining air-clad fiber, where polarization maintaining operation of said ~~air-clad~~ fiber is obtained by the incorporation of stress producing regions into said ~~air-clad~~ fiber.

19. (currently amended): ~~A system~~ polarization maintaining air-clad fiber as claimed in claim 158, wherein ~~at least one of said predominately polarization maintaining fibers is a double or n-tuple clad fiber~~ said fiber comprises additional cladding regions.

20. (cancelled).

21. (cancelled).

22. (cancelled).

23. (cancelled).

24. (currently amended): A chirped pulse amplification system comprising, at least one low group delay ripple nonlinearly chirped fiber Bragg grating pulse stretcher producing stretched pulses; at least one fiber amplifier following said pulse stretcher; and a pulse compressor for compressing said stretched pulses, ~~said producing~~ compressed pulses having an energy >greater than 100 nJ and a bandwidth greater than 1 nm.

25. (currently amended): A system as claimed in claim 24 wherein said pulse compressor includes at least one chirped fiber Bragg grating and a bulk grating.

26. (currently amended): A system as claimed in claim 24 wherein ~~the~~ said pulse compressor comprises ~~a holey~~ or photonic bandgap fiber.

27. (currently amended): A system as claimed in claim 26 wherein the holey or photonic bandgap fiber is engineered to perform complete pulse compression or partial pulse compression.

28. (currently amended): A system as claimed in claim 27, wherein the holey or photonic bandgap fiber which performs complete or partial pulse compression also acts as power delivery fiber.

29. (currently amended): A chirped pulse amplification system, including a short pulse seed source, a fiber grating pulse stretcher, an adaptive pulse shaper, at least one amplifier and a pulse compressor.

30. (currently amended): A ~~CPA~~chirped pulse amplification system according to claim 29, where ~~the~~said at least one amplifier is one of a fiber, Raman, parametric, solid-state or diode amplifier.

31. (currently amended): A ~~CPA~~chirped pulse amplification system according to claim 29, where ~~the~~said adaptive pulse shaper is an adaptive fiber grating based pulse shaper.

32. (currently amended): A ~~CPA~~chirped pulse amplification system according to claim 29, where ~~the~~said fiber grating pulse stretcher and ~~the~~said adaptive pulse shaper are combined into one integrated fiber grating pulse shaping device.

33. (currently amended): A ~~CPA~~chirped pulse amplification system according to claim 32, where adaptive pulse shaping in said ~~fiber grating pulse shapering device~~ is enabled via modifying a refractive index of at least one selectable portion of said ~~grating pulse shapering device~~ by controlling a temperature of said selectable portion.

34. (currently amended): A ~~CPA~~chirped pulse amplification system according to claim 32, where adaptive pulse shaping in said ~~fiber-grating-pulse shapering~~device is enabled via modifying a refractive index of at least one selectable portion of said ~~grating-pulse shapering~~device by controlling an internal stress within said selectable portion.

35. (currently amended): A ~~method~~chirped pulse amplification system as claimed in claim 33 wherein a number of said selectable portions is in a range between 4 and 4000.

36. (currently amended): A ~~method~~chirped pulse amplification system as claimed in claim 34 wherein a number of said selectable portions is in a range between 4 and 4000.

37. (currently amended): A ~~method~~chirped pulse amplification system as claimed in claim 35, wherein a number of said selectable portions is in a range between 4 and 400.

38. (currently amended): A ~~method~~chirped pulse amplification system as claimed in claim 36 wherein a number of said selectable portions is in a range between 4 and 400.

39. (currently amended): A chirped pulse amplification system comprising, a low group delay ripple nonlinearly chirped fiber Bragg grating pulse stretcher, said ~~fiber-Bragg grating-pulse~~ stretcher producing stretched pulses longer than 1 ns; at least one fiber amplifier following said pulse stretcher; and a pulse compressor for compressing said stretched pulses by more than a factor of 50, producing compressed ~~said~~ pulses having an energy of ~~of~~ greater than 1 μ J (1 micro J) and a bandwidth greater than 1 nm.

40. (currently amended): A chirped pulse amplification system comprising, a low group delay ripple nonlinearly chirped fiber Bragg grating pulse stretcher; at least one fiber amplifier following said pulse stretcher and having a substantially step index profile; and a pulse

compressor for compressing ~~said~~ stretched pulses, producing compressed pulses having a bandwidth greater than 1 nm.

41. (currently amended): A ~~fiber~~-chirped pulse amplification system according to claim 3, further comprising an adaptively controlled pulse shaper located up-stream of said at least one fiber amplifier, in order to pre-compensate for self-phase modulation in said at least one fiber amplifier.

42. (canceled).

43. (canceled).

44. (currently amended): A chirped pulse amplification system comprising, a fiber Bragg grating pulse stretcher, said ~~fiber Bragg grating~~-pulse stretcher producing stretched pulses or pulse trains with a prescribed, but freely selectable amplitude and phase profile, at least one amplifier following said pulse stretcher, and a pulse compressor for compressing said stretched pulses, thereby producing output pulses or output pulse trains with a freely selectable amplitude profile.

45. (currently amended): A chirped pulse amplification system according to claim ~~36~~44, where said freely selectable amplitude profile is produced at a target material, the optical beam path between ~~said~~ a bulk compressor and said target material further containing optical material other than air, comprising ~~either of~~ bulk optical materials and/or optical delivery fibers.

46. (currently amended): A chirped pulse amplification system according to claim ~~36~~44, where said output pulses or output pulse trains are used for micro-structuring or micro-machining of a target material and where said freely selectable amplitude profile is optimized for the micro-structuring properties of said target material.

47. (currently amended): A chirped pulse amplification systems according to claim ~~3644~~, where said freely selectable amplitude profile generated by said pulse stretcher is used to counteract gain-narrowing in ~~the~~ said at least one amplifier down-stream from said pulse stretcher, such that the amplified pulse width after compression in said pulse compressor is minimized.

48. (currently amended): A chirped pulse amplification system, comprising, a fiber Bragg grating pulse stretcher system including a plurality of fiber Bragg gratings, each of which is designed to stretch a separate spectral component of an input pulse; at least one amplifier following said pulse stretcher system, and a pulse compressor system for compressing and reconstructing ~~said~~-stretched pulses by incoherent addition.

49. (currently amended): A system as claimed in claim 408 wherein said pulse compressor system comprises a series of bulk compressors spaced so as to temporally reconstruct said input pulse.

50. (currently amended): A system as claimed in claim 408 wherein said pulse compressor system comprises ~~one~~ or more bulk compressors spaced so as to output temporally separated portions of said input pulse.

51. (new): A chirped pulse amplification system comprising, a nonlinearly chirped fiber Bragg grating pulse stretcher system, said pulse stretcher system producing stretched pulses longer than 100 ps and including plural concatenated fiber Bragg grating stretchers; at least one amplifier following said pulse stretcher system; and a pulse compressor for compressing said stretched pulses by more than a factor of 50.

52. (new): A chirped pulse amplification system comprising, a nonlinearly chirped fiber Bragg grating pulse stretcher system, said pulse stretcher system producing stretched pulses longer than 100 ps; at least one amplifier following said pulse stretcher system; and a pulse compressor for compressing said stretched pulses by more than a factor of 50, wherein optimally compressed pulses are obtained at a target downstream from said pulse compressor, where the optical beam-path between said pulse compressor and said target further contains additional optical elements other than air.

53. (new): A chirped pulse amplification system comprising, a nonlinearly chirped fiber Bragg grating pulse stretcher system, said pulse stretcher system producing stretched pulses longer than 100 ps; at least one amplifier following said pulse stretcher system; a pulse compressor for compressing said stretched pulses by more than a factor of 50; and an adaptively controlled pulse shaper located up-stream of said at least one amplifier, in order to pre-compensate for self-phase modulation in said at least one amplifier.

54. (new): A chirped pulse amplification system comprising, a nonlinearly chirped fiber Bragg grating pulse stretcher system, said fiber Bragg grating pulse stretcher system producing stretched pulses longer than 100 ps; at least one fiber amplifier following said pulse stretcher system,; and a pulse compressor for compressing said stretched pulses by more than a factor of 50, said compressed pulses having a bandwidth greater than 1 nm.

55. (new): A chirped pulse amplification system comprising, a nonlinearly chirped fiber Bragg grating pulse stretcher system, said fiber Bragg grating pulse stretcher system producing stretched pulses longer than 100 ps; at least one fiber amplifier following said pulse

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stretcher system,, and a pulse compressor for compressing said stretched pulses by more than a factor of 50.